Agencies' Review Comments on the
Draft Tittabawassee River Segments 4 and 5 Response Proposal,
Dated December 18, 2015
Tittabawassee River, Saginaw River & Bay Site, Michigan

Review comments were received in many different formats. EPA has attempted to consolidate comments for content, but have retained varied formats. If comments are unclear, please contact EPA as soon as possible.

A. Major Comments

1. Superfund non-time critical removal authority is being used for this Response Proposal. As such, and pursuant to the AOC, any decision made by EPA, in consultation with the MDEQ, will not constitute the final remedy for Segments 4 and 5 – a final remedy determination will be made in a later Record of Decision (ROD), after a full risk assessment has been completed. At the time of the final ROD (or earlier, if warranted) the Agencies will evaluate whether additional remedial action objectives (RAOs) and response actions may be necessary for Segments 4 and 5. The evaluations used in this document are sufficient to support the currently identified bases for the planned non-time critical removal action (NTCRA). However, future work will need to evaluate all relevant exposure pathways and receptors and ensure that risks are at acceptable levels.

Response: Comment noted.

2. Sediment Management Areas (SMAs)
    a. The Agencies agree that the two areas currently identified in Segments 4 and 5 should be SMAs. Pursuant to the AOC and SOW, other SMAs may be identified in the future, if warranted.

Response: Comment noted.

    b. The criteria to identify SMAs is somewhat unclear. The identification of SMAs and the criteria may need to be refined over time, depending on the success of the NTCRAs at meeting the RAOs.

Response: Comment noted. The criteria used to identify the SMAs is consistent with those outlined in the Segment 2 and Segment 3 Response Proposals.

    c. Additional areas of interest/potential SMA(s) – There are other areas in Segments 4 & 5 that need more analysis in the RP, in technical meetings or in a supplemental technical memo to be developed on an agreed upon schedule. There are two areas that were discussed in technical meetings that are not addressed in the RP that may be areas of interest of interest or that may need more evaluation as potential SMAs. One area is on the northeast side centered at approximately station 801 (lower II) and the second center channel around station 772 (upper II). The Agencies are also taking a harder look at additional sediment data in Segments 4 & 5. The table of LWAs/core length/sample length and TEQ requested below will greatly facilitate this review.

Response: Additional information and figures related to the areas of interest in Upper Reach II and Lower Reach II have been added to Section 3.8.2.3. Based on multiple lines of evidence, as outlined in Section 3.8.2.3, these areas have not been identified as SMAs. The lines of evidence include TEQ concentrations, extent and depth of elevated TEQ levels, and sediment stability of this area.

d. The SMA boundaries are preliminary and may need to be further refined. Additional delineation is likely to be necessary as part of the design phase of this response. The actual TEQ concentrations present in and around potential SMAs needs to be considered for the final design.

Response: Comment noted.

3. Bank Management Areas (BMAs)
   a. The Agencies generally agree that the sixteen areas currently identified in Segments 4 and 5 should be BMAs. However, some refinements may be needed during design. Additionally, pursuant to the AOC and SOW, other BMAs may be identified in the future, if warranted.

Response: Comment noted.

b. Section 3.9 and Figure 3-15 process – At this time the Agencies are not "approving" the BMA identification process and will continue to work with Dow to evaluate approaches to prioritize the Tittabawassee River banks. As we have discussed and commented on previous RPs, the Agencies consider this to be an adaptive management approach that will continue to be refined in order to meet the shared goal of addressing the worst TEQ contributing banks first. The current stability and TEQ criteria identifying prioritized banks may need to be refined over time, depending on the success at meeting RAOs.

Response: Comment noted.

c. Refinements to the BMA identification process, if needed, could consider: surface TEQ (because the high TEQ is already present at the surface and even relatively low amounts of erosion could present a problem); direct inclusion of bank pins and/or tree roots (as opposed to using them for validation); historic air photo evaluation; evidence of mass wasting; and possibly other evaluation metrics.

Response: Comment noted. As previously discussed with the Agencies, the evaluation of bank TEQ levels focuses on potential TEQ deposits within the bank that could serve as a long-term source of TEQ to the river under erosional conditions. TEQ levels on the bank face are not considered representative of the TEQ inventory in the bank and may include recent in-channel sediment deposited on the bank face. The bank pin and tree root data were used to calibrate the bank erosion model and are therefore incorporated into that line of evidence. Visual field indicators of erosion were also documented during the field characterization work and used to verify the threshold values for low and high stability banks for two of the lines of evidence (bank angle and percent cover).

d. Because Segment 4 & 5 work is anticipated to be concurrent with Floodplain work, it is important that Dow and the Agencies take a pragmatic look at all that might

ultimately need to be done to a property to minimize disruption/ construction/ access to the subject properties.

Response: Comment noted. To the extent practicable, Dow will coordinate remedial activities associated with the river channel, banks, and floodplain to minimize disruptions to individual floodplain property owners.

4. This RP proposes "rules of thumb" for triggering implementation of response actions at SMAs. The scope (volume, areal footprint, etc.) of the SMA alternatives then reflect the proposals, particularly for SMA 5-1. These "rules of thumb" are generally unacceptable to the Agencies and the RP must be revised (both in the text and on the figures that illustrate the responses). More specifically:

Response: Comment noted. See responses to individual comments below.

a. Section 5.1.2, 3rd paragraph states "Under this alternative, caps would be placed in areas where the depth of the elevated TEQ deposit is shallower than 4 ft. below the sediment surface. These caps would supplement the existing natural sediment deposits, where they exist, that overlie subsurface TEQ deposits." This general depth rule is not acceptable. The capping alternative needs to reflect that isolation of the entire SMA footprint (i.e., 0.7 acres for SMA 5-1) will be addressed in both design and long-term monitoring. However, the Agencies do recognize that, in some cases, natural capping or MNR may have attained the isolation intended by capping. Please consider re-writing as follows (or similar): "Under this alternative, caps would be placed on the SMA to isolate the contaminated material from the biologically active zone and to ensure stability of the TEQ deposit. In some portions of an SMA existing cleaner natural sediment deposit may overlie the elevated subsurface TEQ deposit. In such cases, as appropriate, the design of the cap may incorporate both a constructed cap and the existing natural cap." Please delete the last sentence of this paragraph. Then, Section 6 can discuss specific conditions where this may occur.

Response: The text in Section 5.1.2 has been revised. The in-situ containment alternative for SMA 5-1 (Alternative 2) has also been revised to a combination remedy of in-situ containment and MNR, as discussed in Section 5.2.

b. Section 5.1.3, page 60, 3rd paragraph states "Sediment removal would target the depth of contamination to a maximum depth of 4 ft." Also "If elevated TEQ levels are present at depths greater than 4 ft, existing sediment or newly deposited material in the removal areas would be used to provide a natural cap over the contaminated material and isolate the buried sediment from the biologically active zone." This general depth rule is not acceptable. Removal only alternatives should address the entire TEQ deposit. The Agencies recognize that there are SMA-specific considerations that influence the potential tradeoffs of this alternative (effectiveness and implementability), but those considerations can be explicitly discussed in Section 6. Also, there may be cases where it does not make sense to develop a removal only alternative at a particular SMA, again – discuss in Section 6. Preliminary depth cuts for both SMAs should be re-evaluated in the revised RP.

Response: The text in Section 5.1.3 has been revised. Dredge removal depths have been updated to capture the depth of contamination. Specific considerations for each SMA are further discussed in Section 6.

c. Modifications to additional parts of the RP, especially Section 6 and some figures will be needed, based on these comments.

Response: The appropriate text and figure revisions have been made to correspond to the changes made to the SMA 5-1 remedial alternatives.

5. Combination remedy for SMA 5-1 – Consistent with comment 4, above, Alternative 4 for SMA 5-1 should be reconfigured to address the entire 0.7 acre footprint and appropriate TEQ deposit depths. As appropriate, it can include removal, constructed cap, and either natural cap or MNR.

Response: The description SMA 5-1 Alternative 4 has been revised to include removal, in situ containment and MNR.

6. SCOIs – On December 18, 2015, Dow submitted the "Sediment and Bank Soil SCOI Screening for Segments 4 through 7, Tittabawassee River." The Agencies have not completed our review of the SCOI screening, but have commented previously on the SCOI evaluations done in upstream segments. EPA has determined that the bases for action presented in this RP 4&5 are appropriate to proceed with development and selection of NTCRA response options for the currently identified Segments 4 & 5 SMAs and BMAs. The Agencies are not "approving" the conclusions about SCOIs found in Section 3.7. Comments on the SCOI screening will be sent separately. SCOIs must be fully addressed in the Task 10 residual risk assessment, may result in additional Segments 4 & 5 analysis/work and/or post-construction monitoring.

Response: Comment noted.

7. Benthic Community – Section 3.5.1 contains a brief discussion of Segments 1 and 2 benthic community conditions. The Agencies have questions about the conclusion that "the benthic community in Segments 1 and 2 is diverse, abundant, and comparable to ….reference conditions" because there is some uncertainty about how representative the sampling locations were and validation of the site selection, observations, scoring, and calculation of metrics. Also, as noted, no sample locations were included in Segments 3, 4 or 5. Benthos and other biological receptors (e.g. fish, birds, reptiles, and amphibians) will need to be considered in the ecological risk assessment. As such, the Trustees have recommended that it might be appropriate to perform benthic surveying to have baseline information on benthic communities, including freshwater mussels, prior to implementation of work on Sediment Management Areas in Segments 4 and 5.

Response: Comments noted. Site selection and the habitat characterization information is provided in the Benthic Community Assessment Report. The Response Proposal for Segments 4 and 5 acknowledge that benthic community data from Segments 3, 4, or 5 are not available. Dow is not planning to conduct a benthic community assessment at this time.

B. Specific Comments

8. Executive Summary – There may be changes to this summary based on the comments on the main text. Also, please clarify that the Response Proposal (RP4/5) may not address all of Dow's remedial obligations with respect to the segments, and that further work to address other exposure pathways such as human direct contact and ecologic risk will be conducted as part of the Floodplain Response Proposal and/or the Task 10 residual risk assessment(s).

Response: The Executive Summary has been updated to reflect revisions to the text, as appropriate. Language has been added to clarify additional remedial obligations that may be necessary following the completion of the Task 10 residual risk assessment.

9. *Section 2.3, p. 6. "Several dams were constructed around this time to provide hydroelectric power and a clean water supply. The dams also controlled river flows and limited peak flood events." Comment:* The Trustees believe that this paragraph does not provide a good understanding of the influence of dams in the river downstream of Midland. Although four hydropower dams were constructed on the Tittabawassee River, all are upstream from the City of Midland. Fluctuations in flow from the Sanford Dam affect water levels and erosion in these segments. The Dow Dam at Midland is a barrier to fish passage

Response: Comment noted. This background section of the report provides general descriptions of dams constructed in the early 1900s; current implications of the dams on flow or fish passage are not discussed. No changes were made to the RP.

10. Section 2.5 – PCOI Distributions in the River. The duration of the period of direct discharge to the river is not known. It would be more accurate to state (additional/modified language in ***italic boldface***): ***Beginning with the direct discharge period in the early 1900's, the waste anode and cell body particles*** containing the PCOI contaminants mixed ….(or similar).

Response: The text has been revised to include cell body particles. Direct discharge to the river ended in 1920.

11. Section 2.6.1 - In Channel Geologic Stratigraphy**,** Page 9. This section should be clarified to indicate that glacial till does contain till sand units that can be extensive. These till sands are commonly used for as a potable water source in the study area.

Response: Although till sand units have been identified in some areas of the river, sediment cores collected from Segments 4 and 5 do not indicate the presence of till sand units. No change was made to the RP.

12. Section 2.7.5 – Island MM is in Segment 5, not Segment 4.

Response: The text has been revised.

13. Section 3.2, page 19, 2nd paragraph and 3.2.1, page 21, 5th paragraph – Were additional composite samples collected in 2015? If so, discuss here and update other sections of the report if the results are available. Also please discuss the change in how the 2015 sediment ICS processing differed from the earlier samples, as it may help interpret the results and their variability. Please note that the Agencies have not fully approved this methodology (see the approval with modification letter from EPA to Dow dated May 10, 2012), but are

open to working with Dow to continue to refine this methodology to improve its potential usefulness, especially for long term trend monitoring and to better understand surficial sediment TEQ concentrations

Response: The 2015 in-channel composite data were not available when the Draft Segments 4 and 5 RP was submitted. The 2015 in-channel composite sampling is now described in Section 3.2.

14. Section 3.2.1, pages 19 -22:
    a. Previously in the review of the response proposals for Segments 2 and 3, the DEQ has requested that Figures 3-2A and B and 3-3A -D be revised or supplemented with figures that show TEQ concentrations less than or equal to 100 parts per trillion (ppt) TEQ and greater than 100 ppt TEQ but less than or equal to 500 ppt. The requested modifications were not made. As an alternative, please expand the section to include a new table that lists the length weighted average TEQs (LWAs) for each of the cores and identifies the core intervals (length and TEQ) used to calculate the LWAs. In this way the Agencies would have ready access to the information and could spot check the calculated LWAs and verify that the length of core used is appropriate.

Response: The TEQ levels and the sample lengths for each individual core have been made available to the Agencies in the project database that was originally submitted in July 2010 and is updated every six months. As discussed in Section 3.8, the extent and magnitude of elevated TEQ levels is only one line of evidence used to identify SMAs.

    b. P. 21, 3rd paragraph *"The lateral and vertical distribution of TEQ levels based on the sampling and analysis conducted during 2007-2015 suggest that contiguous deposits of elevated TEQ levels in Segments 4 and 5are confined to areas on the southwest side of Middle Reach II and the northeast side of upper-Reach KK."* See Major Comment 2.b above, regarding potential additional SMAs.

Response: See response to Major Comment 2c above.

    c. Please provide stationing for Figure 3-6

Response: The figure has been updated.

    d. Please consider augmenting this section with a description/calculation of the uncertainty associated with the composite surface sample average concentrations and the surface weighted average concentration presented for Segments 4 & 5.

Response: It is unclear what is meant by "uncertainty" associated with the composite sampling and the surface-weighted average concentrations. The surface-weighted average concentrations were determined by spatially weighing the surface TEQ measurements using a Theissen Polygon approach, and calculating the average. The in-channel surface composite results are presented in Figure 3-6; where samples were collected in triplicate all three results are presented. Understanding the confidence intervals of surface sediment concentrations will be more applicable during long-term monitoring when changes in surface TEQ levels over time are being assessed.

e. Please include and discuss the bed load sampling results (if any) for Segments 4 & 5.

Response: Only four bedload samples were collected in Segment 4 during 2008 and analyzed for TEQ from Reaches CC and II. In contrast, the 2014 and 2015 composite surface sediment results provide a much more complete and more recent dataset for all of Segments 4 and 5. Thus, the RP relies on this dataset and the SWAC calculations to understand surface sediment and bedload concentrations.

15. Section 3.2.3 – Core Log Review:
    a. The text notes "oily/greasy" at II-787+00-IC983. This location appears to be a typo. Please correct.

Response: The text has been revised.

    b. It is not appropriate to conclude that there is no indication of "atypical sediment conditions" based on the text of this section. Analytical data for the SCOIs has not been collected from the "oily/greasy" core location. Atypical conditions have been identified by the core log review. Follow-up assessment at this location for SCOIs may be needed. Please also note if any other review of the boring logs was conducted to determine if elevated photoionization detector (PID) reading or odor was present at this or any other Segment 4 & 5 locations.

Response: Based on the review of the core logs, and the general SCOI conditions in Segments 4 and 5, no indications of atypical sediment characteristics warrant further investigation for the purposes of this Response Proposal. It should be noted that an "oily/greasy look" within the sediment core may be a result of natural oils within the sediment. The core logs do not provide PID readings. Odor was detected when logging one core collected from Segment 5 (RII-785+00-IC122). SCOIs samples were not collected from that core.

16. Section 3.2.2 – In-Channel Sediment Secondary Constituents of Interest: See Major Comment 6, above.

Response: See response to Major Comment 6 above.

17. Section 3.3.1.1 – Nature and Extent of Bank Soil Contamination, Page 23 Last Paragraph. This paragraph indicates "…that shoreline and high surface/upland geomorphic units along the bank do not contain deposits of TEQ that are likely to be an erosional source to the river,…". The Agencies do not necessarily agree with this conclusion, but acknowledge that these deposits have not been prioritized for response because the thickness of the deposits is small relative to the post-industrial levy deposits and/or because of what is known about TEQ levels. Depending on the success of addressing the targeted BMAs' these deposits may need to be reconsidered.

Response: Comment noted. No change was made to the RP.

18. Section 3.3.2.1 – PCOI Results from 2006 – 2014 Bank Soil Coring
    a. Similar to the requests on SMAs, the Agencies would find it more useful if Figures 3-8A – 8F showed more refined TEQ concentration intervals (less than or equal to 250 ppt TEQ and greater than 250 ppt but less than or equal to 500 ppt TEQ and greater than 1000 ppt but less than or equal to 2000 ppt TEQ, consistent with the clean-up

criteria identified in the Floodplain Response Proposal). This could help in understanding the BMA prioritization and for integrating the bank areas with the floodplain assessment/cleanup.

Response: Figures 3-8A-D are intended to show the nature and extent of TEQ within the Segment 4 and 5 banks, and the TEQ breakpoints used in the in the figures are consistent with previous Response Proposals. A comparison of floodplain TEQ levels to the floodplain criteria will be provided as part of the floodplain segment-specific design documents, and is not included as part of the Segments 4 and 5 RP.

b. Page 24. Paragraph 1. The RP states that "The bank LWA TEQ level was calculated to the bottom of the bank because . . . to be a potential source to the river." More explanation may be needed here. For example, Figure 3-8B show a core located near 780+00 that has about 5 feet of >10,000 ppt TEQ present below the "Approximate Bottom of Bank" line. How does this match the CSM? Might these conditions be indicative of potential shoreline SMA deposits?

Response: Elevated TEQ levels below the bottom of the bank are not inconsistent with the CSM for the river. Following the logging era, the Tittabawassee River was deeper and wider in some areas than it is today. During the time of agricultural and industrial practices the river channel became shallower, levees formed, and in some areas TEQ became incorporated into the sediment bottom and levees. In-channel samples were collected near the north shoreline near station 780+00, and the results did not indicate a potential SMA.

c. General Comment. Please expand the section to include a new table that lists the LWAs for each of the bank cores and identifies the core intervals (length and TEQ) used to calculate the LWAs. In this way the Agencies would have ready access to the information and could spot check the calculated LWAs and verify that the length of core used is appropriate.

Response: The TEQ levels and the sample lengths for each individual core have been made available to the Agencies in the project database that was originally submitted in July 2010 and is updated every six months. The bank intervals included in the LWA calculation are those intervals above the bottom of bank line identified in Figure 3-8.

19. Section 3.3.2.3 – The BFC TEQ results may be important in that they show the actual exposed concentration of bank soils that may be eroding into the river. As noted in previous comments on this issue, the surface concentrations of TEQ in bank soils may be an important factor in determining what banks are prioritized for stabilization and what type of stabilization is proposed (i.e., for banks with high TEQ currently exposed at the surface, stabilization technologies that include a barrier component may be more appropriate

Response: See response to Comment 3.c. Surface soil TEQ levels at the banks are being evaluated and addressed, if necessary, as part of the floodplain response actions.

20. Section 3.3.3 – Bank Soil SCOIs: See Major Comment 6, above.

Response: See response to Major Comment 6 above.

21. Section 3.4.2 – Bed Pin Analysis

a. Have the rebar bed pins been removed and replaced with a GPS measure? If so, explain that change in procedure, and when it took place.

Response: The text has been updated to discuss current bed pin monitoring procedure.

b. Please include 2015 bed pin data in Appendix C3.

Response: Appendix B3 has been updated to include 2015 bed pin data.

c. The bed pin cross sections demonstrate an active bed depth of greater than 2 feet in a number of locations in Segments 4 and 5.

Response: Comment noted.

d. There are locations where additional bed pin transects may be appropriate to evaluate TEQ deposits that have not currently been identified as SMAs. Consideration should be given to how these deposits will be monitored in the future.

Response: Comment noted. Sediment areas not identified as SMAs are not expected to be a significant source of TEQ to the sediment bed over time, and would therefore not need to be monitored. Regardless, the elevation of the sediment bed could be monitored similar to the existing protocols.

e. During our recent technical meetings and review of the 2014 Annual Report (received in December of 2015) it was reported by Dow that some bed pin transects had been removed from service in upstream segments. This needs discussion. In some cases bed pin monitoring may be necessary to continue to verify the stability of deposits that have not been removed or capped.

Response: See response to Comment 21a and 21d.

22. Section 3.5.3, Threatened and Endangered Species

a. The text states that there are not documented occurrences of Indiana bats in Saginaw or Midland Counties, but Table 3-4 lists both as County(ies) of Documented Occurrence. Please reconcile.

Response: The tables and text have been reconciled. In the tables "Counties of Documented Occurrence" has been changed to "Counties of Potential Occurrence".

b. The 1st paragraph states: “A summary of federal- and state-listed threatened and endangered species that could be associated with Segments 4 and 5 is provided in Tables 3-4a and 3-4b. Sources used in this updated evaluation include federal (USFWS 2014) and state (MNFI 2014) lists of threatened and endangered species.” Both the USFWS and MNFI references here should be re-checked and updated to 2016, or at least late 2015. Also, footnote to Table 3-4b states that MNFI was checked in “January 18, 2012.” This needs to be updated.

Response: The Table 3-4b 2012 reference was updated to match Table 3-4a reference (i.e. September 2, 2015). References were also updated in the report.

c. The Trustees have recommended that surveys be conducted for freshwater mussels and Indiana bats, and planning for measures to be taken if listed species are found.

Response: Comment noted. Dow is not planning to conduct a bat survey at this time. Freshwater mussels will be translocated, as required, during in-channel and bank sediment management activities. Per USEPA's memorandum dated April 26, 2016, no federal endangered or threatened mussel species were identified as having a possible presence within Saginaw County.

23. Sections 3.7.2 and 3.7.3 – Direct Contact Ecological Receptors, Page 35. Last paragraph. The RP4/5 text indicates that the SCOI data set is spatially comprehensive. This is a bit of an overstatement. The data set may be adequate to identify responses. Additional data collection may be necessary for residual risk assessment. Also, see Major Comment 6.

Response: The text is in reference to the sediment and bank soil data sets. It says "These datasets are comprehensive with respect to the number of SCOIs that have been measured and their spatial distribution." This is in reference to the 94 samples each analyzed for 160 SCOIs. In this regard, the datasets are comprehensive (i.e., broad, wide-ranging, and inclusive). The sentence was revised to state, "These datasets are comprehensive extensive with respect to the number of SCOIs that have been measured and their spatial distribution."

24. Section 3.8.1, Identification of SMA Locations in Segments 4 and 5
    a. The RP would benefit from more detail on the multiple lines of evidence cited for the identification of a SMA. What concentration is considered elevated? What constitutes a contiguous deposit? How are the TEQ composite sample results factored into the evaluation?

Response: The lines-of-evidence approach used to identify SMAs in the Segments 4 and 5 RP is consistent with the approach used in Segment 2 and Segment 3 RPs. The text in Section 3.8 describes how each of these lines of evidence were considered when evaluating whether areas with elevated TEQ should be identified as an SMA.

    b. See comment 2b regarding potential other SMAs.

Response: See response to Major Comment 2c above.

    c. Page 34. Paragraphs 3 and 4. The 10,000 ppt TEQ level was established as an Interim Response Activity level to help determine if early action was needed to control short term transport risk. The 10,000 ppt TEQ interim response value in not a final cleanup criterion.

Response: We agree. The Response Proposal does not state 10,000 ppt is a cleanup criterion.

    d. 3rd paragraph and Section 3.8.2.1 – There are statements here that 7 cores have individual TEQs greater than 10,000 ppt, but figures 3-11 and 3-12 show 5 cores with individual TEQs greater than 10,000 ppt included in the SMA boundary. Please provide some discussion of the other 2 cores (e.g., surficial bedload).

Response: The text has been revised.

e. The Agencies do not necessarily agree with the description of the bed stability in middle Reach II. The statement "…and bed pin measurements within the SMA boundary show minimal change in the sediment bed elevation between monitoring events…" may not be relevant to the question of bed stability over the long term. The important measure is the overall change in the bed depth over time, not between monitoring events. We are concerned with the loss of the deposit over the long term – not just between monitoring events. Bed pin transect 783+00, which is squarely within the proposed SMA, shows up to 4.2 feet of change in bed depth at and proximal to the proposed SMA.

Response: Both sediment elevation changes between bed pin monitoring events and over the long term were reviewed. The maximum elevation differential between any two bed pin monitoring events is 4.2 ft at bed pin transect 783+00-EP2, which is located in the center of the channel, outside of the SMA boundary. The SMA boundary is located on point bar on the southwest side of the channel, where the maximum elevation change was 2.2 ft based on the bed pin monitoring data.

f. Likewise, the description of bed stability in upper KK indicates that the deposit is located 1 foot below the sediment surface. Bed pin analysis in this area show over 1 foot of change in bed elevation over the period when measurements have been taken. The active bed appears to impinge on the deposit.

Response: The description of the stability of the deposit in upper KK has been clarified.

25. Section 3.8.2.3 – Other Areas of Interest in Segment 4 and 5. Page 35. Paragraph 4. Please revise the last sentence in this paragraph which states "…do not represent a contiguous deposit of elevated TEQ". The data indicate a small but elevated TEQ deposit. The analysis should also note where in the cores the TEQ is elevated. It is noted that there are no bed pins located at this deposit and this should be considered for future monitoring.

Response: The text in Section 3.8.2.3 has been expanded, and figures now accompany the descriptions of the TEQ levels in the areas of interest.

26. Section 3.9 – Bank Management Areas, General Comments
    a. As noted below, the Agencies are requesting the underlying data sets that support the bank stability lines of evidence (LOE) and the relative TEQ indices. These might be in existing data sets, or in new figures, tables, or appendices to supplement the RP.

Response: See responses to Comments 29a and 31 below.

b. The DEQ recommends changing the wording for "bank stability" in this section and on Figure 3-15 to "***current*** bank stability" to reflect that the initial evaluation is at a point in time and that ongoing evaluation of the stability of high TEQ bank deposits will be part of the long-term monitoring

Response: Monitoring of the high TEQ index banks in high/moderate stability banks areas will be conducted. The terminology describing bank stability has not been revised.

27. Section 3.9.1 – Banks in Hardened Surface Areas. These areas may contain high TEQ indices. If so, they should be identified and tracked/monitored. Bank failures occur and

modifications to bank treatments can occur over time. Also, representative photos of each of the banks being excluded from evaluation would be useful because there are a wide range of bank hardening treatments and some are more effective than others.

Response: Dow did not construct the hardened surface banks and does not have an obligation to monitor these banks. However, if a hardened bank has failed, Dow will determine if the bank is a significant source of TEQ to the river and if additional measures are warranted.

28. Section 3.9.2 – Banks with Shoreline or Upland/High Surface Geomorphological Features. If the shoreline geomorphic units are not evaluated as part of the BMA determination process, and they contain elevated concentrations of TEQ, as appropriate, they may need consideration as a shoreline SMA and/or as part of the Floodplain response evaluation.

Response: Surface bank TEQ levels, including shoreline and upland/high surface bank TEQ levels, are considered as part of the floodplain response actions.

29. Sections 3.9.3 Bank Stability Evaluations
    a. Where does the bank stability evaluation data reside? The Agencies should have access to the data for each stability LOE by transect location, both for the site record and to review conclusions in the RPs. Some of the LOEs are summarized graphically on figures (e.g., undercutting, levels of exposed roots). The Agencies are requesting the data for each bank stability LOE either as an Appendix to the RP, in the site data base, or in another agreed form.

Response: The results for each individual bank stability line of evidence for Segments 2 through 5 will be provided in the July 2016 database submittal.

    b. The RP does not appear to use bank pin and/or tree root data in the bank evaluation process. Where present, these LOEs should be compared to model-predicted erosion rates and used to validate determinations of bank stability – especially when those banks are high TEQ index banks.

Response: The bank pin data and tree root data were used to calibrate the bank erosion model and are therefore incorporated into that line of evidence. Field indicators of erosion were documented during the field characterization work and used to verify the threshold values for low and high stability banks for two of the lines of evidence (bank angle and percent cover).

    c. Sections 3.9.3 and 3.9.3.7 – Section 3.9.3 states “The third step of the BMA evaluation process (Figure 3-15) focuses on assessing the current stability of the Segments 4 and 5 banks that were not in areas with hardened (e.g., riprap) banks or within shoreline or upland/high surface geomorphological units (i.e., those identified under Steps 1 and 2 above).” However, the results of stability evaluations reported in Section 3.9.3.7 seem to have reported stability only eliminating the hardened banks. For example, Segment 4 is reported as 6.9 miles, with 0.5 as hardened and 0.7 as shoreline or upland/high surface geomorphological units. If the process in 3.9.3 and on Figure 3-15 were followed, stability evaluations should be reported for 5.7 miles, but 6.4 are reported. However, it may be better in practice to continue to report the stability evaluation for all non-hardened surfaces, and certainly should be retained in the site data.

Response: The stability bank lengths have been updated to exclude hardened surfaces and the shoreline and upland/high surface geomorphological units.

30. Section 3.9.3.6 – Model Predicted Bank Erosion Rate.
    a. The calculated rate appears to reflect an average rate over the entire bank full bank face within a 300 foot grid cell. Therefore, the model predictions need to be evaluated cautiously as the averaging process may mask local areas of erosion that may be significant. The bank model erosion rate LOE is a model prediction. When that prediction does not match the empirical LOEs then the model output may be suspect for that location.

Response: Comment noted. See also Response to Comment 30b below.

    b. The rationale for selecting a 2.5 inch per year erosion rate as the threshold between high/moderate stability and low stability is not clear. Over two feet of erosion in ten years does not seem to be "stable" – especially with respect to contamination that is near or at the bank face.

Response: As described in the Segment 2 Response Proposal and Segment 3 Response Proposal, an erosion rate of 2.5 inches per year (in/year) was selected as the value for indicating high/moderate (less than or equal to 2.5 in/year) or low (greater than 2.5 in/year) stability for this line of evidence. That value was selected using an evaluation that indicated that banks with model predicted erosion rates of less than 2.5 in/year contribute less sediments via bank erosion per unit bank relative to those with higher erosion rates. This same value is used for this line of evidence for Segments 4 and 5. It should be noted that the predicted erosion rate is the average erosion rate within a 300-foot model grid cell. As such, there may be locations within the grid cell at which the erosion rate is above or below that rate. In addition, because the grid covers 300 feet, there may also be locations where the average grid result differs from empirical evidence. Because of these uncertainties, the model results are only one of several lines of evidence used to characterize current bank stability.

    c. While the modeled magnitude of the erosion rate is useful for prioritizing the banks for action, the Agencies are not "approving" a modeled loss to the river of contaminated bank soil at less than 2.5 inches per year as being acceptable.

Response: Comment noted.

31. Section 3.9.4, Evaluation of Bank TEQ – Please provide the Relative TEQ Index for Segments 2 – 7 either as an Appendix to the RP, in the site data base, or in another agreed form. This should include the locations of each of the banks included in the Index, the length of the bank and the TEQ value(s) used to represent the bank segment. This is an important part of the site record as it is used to prioritize banks for remedial activities.

Response: The relative TEQ index information (including bank location and associated TEQ index percentage) for Segments 2-7 banks will be provided in the July 2016 database submittal.

32. Section 3.9.5 – The bank lengths in each category do not quite add up. On page 44 it says there are 1.7 miles of intermediate TEQ banks, while on page 43 it talks about 0.7 and 1.1, which would be 1.8 miles.

Response: The bank lengths have been rounded to the nearest tenth of a mile. The total bank lengths are correct. Due to the rounding, the summation of the two separate bank lengths is off by one-tenth of a mile.

33. Section 4.1 Segments 4 and 5 Conceptual Site Model and Basis for Action
    a. Neither Figure 4-1 nor the text addresses the pathway of floodplain soils eroding back into in-channel sediments. The magnitude and significance of this pathway is not currently known.

Response: Comments noted.

    b. Please note that fish also accumulate PCOIs through respiration of water (both fine particles suspended in water column and dissolved phase PCOIs).

Response: The text states "Fish primarily accumulate TEQ through direct sediment contact or through the biological food web insofar as food web pathways are connected to the sediment bed." A sentence was added that indicates "Uptake via the gills can also occur."

    c. Page 46, last paragraph – This text indicates that the PCBs are not site-related. The Agencies are not necessarily in agreement with this, given that DEQ and Dow sampling of DNAPL in 2011 and 2012 from several of the Segment 1 SMAs has shown the presence of coplanar PCBs.

Response: Comment noted. No changes have been made to the RP. Dow does not believe that PCBs detected in fish are related to the site.

34. Section 4.2 - Remedial Action Objectives
    a. The RAOs should be linked to contributing to or achieving acceptable risk levels. The Task 10 assessment will need to evaluate other pathways and whether residual site contaminants achieve acceptable human health and ecological risks.

Response: Comment noted. The RAOs presented in the Segments 4 and 5 RP are consistent with the RAOs presented in the Segment 2 and Segment 3 RPs. The RP currently states "Other pathways of concern such as human direct contact and terrestrial ecological risk are being addressed in the Floodplain Response Proposal and/or the Task 10 RRA".

    b. Please note that the 2010 SOW also other General Response Objectives that will need to be evaluated, and met if needed, before response actions can be considered complete.

Response: Comment noted.

    c. Measurable Metrics. The RP identifies four measurable metrics. Discussion on how these metrics will be accurately measured, evaluated, and related to the identified Performance Objectives needs to be provided in the RP or Task 4 Monitoring Plans. Additionally, other metrics may be necessary to meet the requirements of the SOW.

Response: Comment noted. The process for measuring and evaluating the measureable metrics against the performance objectives will be outlined in the Task 4 Monitoring Plans.

35. Section 4.3.1 Potential Chemical-Specific Requirements – Please modify footnote 7 as follows, or similar: [FN7] "It should be noted . . . As appropriate, cleanup criteria/numbers/non-numeric criteria (e.g., under Part 201, NREPA) may be evaluated as potential chemical-specific ARARs for any future risk-based responses. Michigan's Part 201 criteria were identified as a chemical-specific ARAR for the risk-based Tittabawassee River Floodplain Response Proposal."

Response: The text has been revised.

36. Sec. 4.3.2.7 Michigan Natural Resources and Environmental Protection Act (NREPA) – Please consider re-writing for clarity: "Michigan Administrative Code Rule 901(a), was promulgated as Rule 336.1901 under Part 55 of NREPA, Air Pollution Control ~~Michigan Administrative Code Rule 336.1901 (Rule 901) was promulgated under the authority of Part 55 (Air Pollution Control) of the NREPA~~, MCL 324.5501 *et seq.* Rule 901(a)…."

Response: The text has been revised.

37. Section 5
    a. 3rd Bullet – This bullet indicates that "…no long-term bank monitoring or management of the SMAs would be required after sediment removal" should be clarified with the addition of "***if the high TEQ deposit is removed***," or similar. If a SMA deposit is only partially removed, then addition long term obligations will persist.

Response: The text has been revised.

    b. 4th Bullet – Please add that in some cases bank soils may be removed and disposed of in order to achieve an appropriate bank angle for stabilization.

Response: The text has been revised.

    c. 5th Bullet – The last sentence indicates that "no long-term bank monitoring or management would be required under this option" should be clarified with the addition of "***if the high TEQ deposit is removed***," or similar. If a high TEQ bank is only partially removed and high TEQ soils remain, then addition long term obligations will persist.

Response: The text has been revised.

38. Section 5.1.1, Monitored Natural Recovery
    a. Page 57, SMA 5-1 and 5-2 bed pin (and bathymetric data) shows that these deposits or portions of the deposits are currently vulnerable to exposure of or erosion of the elevated TEQ, and may not be good candidates for an entire MNR remedy.

Response: Comment noted. Section 5 simply describes the sediment response options, including MNR. The evaluation of MNR effectiveness for each SMA, including sediment bed stability, is provided in Section 6.3.

    b. Page 57, 5th paragraph – The text indicates that: "A key determinant of the effectiveness of MNR within a given SMA is sediment bed stability, which is related to the dynamic equilibrium of the bed over annual time scales…" This statement

ignores the importance of episodic events that can cause the deposit to be lost. The active bed depth (as determined by bed pin analysis) shows that portions of the deposits at SMA 5-1 and 5-2 may be at risk of loss without removal and/or capping

Response: The text in Section 5.1.1.1 has been clarified.

39. Section 5.1.2, page 59 – Cap monitoring may also need to assess the impact of the cap (if any) to sediment stability outside the cap.

Response: The last paragraph of Section 5.1.2 has been updated.

40. Section 5.2 - BMA Response Alternatives
    a. This section correctly notes that the specific remedial technologies and process options most appropriate for BMAs depends on a number of location-specific issues. This list might be expanded to include the bank surface concentrations of PCOIs.

Response: See response to Comments 3c and 19, above.

    b. General. It may be prudent to include a capping/cover component to the stabilization actions in the RP in order to provide the flexibility to address the potential for exposure pathways other than erosion to the river (i.e., direct contact with high concentration surficial soils).

Response: See response to Comments 3c and 19, above.

    c. Chemical monitoring/additional bank surface TEQ characterization may be necessary to determine if other exposure pathways are relevant on the banks.

Response: Bank surface TEQ levels are being addressed as part of the Task 10 residual risk assessment and floodplain response actions.

41. Section 5.2.2 – This section states that bank removal was done in Reach N. This is overstating the situation, and may be confusing. If anything, this should be discussed as a limited partial removal. The footprint of the removed area was small – not an entire bank stretch and O&M is still required for the remaining stabilized bank.

Response: The text has been clarified.

42. Section 6.2 – Common Elements – Page 65. The 6th bullet should indicate that Operations and Maintenance may be required for partial removals and combination responses.

Response: Sediment removal has been updated to extend to the depth of contamination. Therefore, no changes were made to Section 6.2.

43. Section 6.3.1.1 – Overall Protection of Human Health and the Environment
    a. Alternative 1 (MNR). Paragraph 2 indicates that "the bed overlying the majority of the SMA 5-1 (downstream of 782 +00) is stable." This may be an overstatement. Figure B3-13 shows Bed Pin Transect RII-783+00 and shows elevation changes of

up to 4.2 feet within or adjacent to the footprint of the SMA. Figure B3-14 shows Bed Pin Transect RII-785+00, with changes of 1.9 feet within the footprint of the SMA. These results and the upstream data indicate that MNR may not be an effective alternative for SMA 5-1.

Response: The text indicates the maximum bed pin elevation change is approximately 2 ft. (The maximum bed pin elevation change of 4.2 ft was measured on the in-channel slope, not the point bar of the SMA; see response to Comment 24e). We agree that MNR may not be an effective remedy for SMA 5-1, as indicated in the last sentence of this paragraph.

b. Alternative 1 (MNR). Page 67. Paragraph 3. The information provided in the RP4/5 do not support the statement "…buried SMA TEQ deposits have a relatively low likelihood of being eroded and transported downstream…" The bed pin data shows up to 1.2 feet of change over the time monitoring has been conducted. Some portions of SMA-2 have only a foot of relatively cleaner material over the high TEQ deposit. Contaminated materials may be present at or within the active bed depths. The shallow nature of the high TEQ deposit and the greater than one foot active bed may make MNR a poor alternative for this deposit.

Response: The complete sentence provided in the Response Proposal states, "Based on the sediment-stability weight-of-evidence evaluation, the buried TEQ deposit in SMA 5-2 has a relatively low likelihood of being eroded and transported downstream at levels that would substantially affect surface sediment TEQ levels." Figures 3-13 and 3-14 demonstrate a low likelihood of the buried deposit becoming integrated into the active bed.

c. Alternative 3 (Removal), page 68, 1st paragraph, last sentence. Volumes of sediment may need revision based on comment 2.b. Please modify sentence (or similar): "The need for a post-removal residual sand cover would be determined during design, at the time of construction, or based on further sediment transport assessments.

Response: Text has been updated.

44. Section 6.3.1.2 – Compliance with ARARs. Alternative 2 (In Situ Containment) and Alternative 4 identifies a 0.1 foot limit mandated by the Michigan Floodplain Act. This has been reviewed by DEQ Water Resources Division staff and DEQ has determined that no increase is allowed under the Act.

Response: Comment noted. Our understanding is that the Michigan Floodplain Act mandates a 0.1 ft limit in flood height.

45. Section 6.3.1.4, Short-term effectiveness → do we want to add some more details than we've provided in the past RPs? For example:
    a. Section 6.3.2 (Implementability) provides some good information about preliminary access roads. Might it be useful to bring some of these details into the short-term effectiveness discussion to make it clear that construction of access and support areas also have effectiveness considerations, as well as implementation concerns? Then, there could be a distinction – better able to control and/or mitigate effects in fields vs. sparsely wooded vs. wooded.

Response: Additional text was added to this section to describe short-term impacts.

b. Alternative 2, page 69 – It would be useful to augment this section with a discussion of short-term construction impacts related to site access for armored cap placement (roads, heavy equipment, etc.).

Response: Short-term construction impacts are addressed in section 6.3.4.2. No changes have been made to the text.

c. Alternative 3 – Might it be useful to try to provide some estimates of what the footprint of staging and dewatering areas might look like, especially for wet removal, and then briefly discuss related to the impact to the nearby area/ecosystem? For example, the sediment management/dewatering area for Reach D required about 4 acres of land. Since that was hydraulic dredging and a larger volume, the footprint for the Segment 4&5 SMAs might be smaller.

Response: This refers to what is now Section 6.3.4.3. The text states, "Site modifications to gain access required for heavy equipment and staging could require significant construction and restoration of the shoreline and floodplain." Estimates of floodplain acreage that would be impacted have been added.

d. Alternative 3 – The 3rd paragraph on page 71 mentions increased truck traffic. The RP provides volume estimates of sediment for removal (in Appendix C). Might it be useful to provide the approximate numbers of trucks transporting contaminated sediment this might mean?

Response: The text has been updated in Section 6.3.4.3 to provided estimates of total truckloads needed for removal.

46. Section 6.3.1.4, Alternatives 3 and 4 – The Trustees commented that bank and in-stream restoration following removal could also include placement of large woody debris to replace structure, differential flows, and woody surface area that provide microhabitats for production of algae, macroinvertebrates, and fish. Placing large woody debris at or near removal areas might help mitigate short-term impacts of the removal.

Response: The text has been revised.

47. Section 6.3.1.4, Alternative 4 – Please address whether sheet pile around the removal area could cause unintended scour of the natural cap/MNR portions of the SMA, and how this will be mitigated. Also, it might be useful to expand the discussion about how the combination minimizes short-term effects that might be found from implementing a single technology.

Response: Remedial design of the SMAs will consider the potential impacts of sheet pile placement, so that potential sediment erosion outside of the sheet pile wall is reduced. Bathymetric surveys before and after removal will demonstrate whether significant removal outside the sheet pile wall occurred. The short-term impacts of SMA 5-1 Remedy Alternative 4 as compared to Alternative 3 is provided in Section 6.3.4.4.

48. Section 6.3.1.5, Long-Term Effectiveness and Permanence
    a. Alternative 1 discussion – MNR has not been demonstrated to be effective on an acceptable timescale in the absence of additional secondary source controls, even decades after primary source controls have been implemented at the Dow Plant site.

Other items that are not discussed include: Institutional controls would also be necessary to restrict dredging/bottom disturbance at SMAs (i.e. prop wash, restrictions on dredging, etc.); changes in river morphology could alter the course of the main channel and erode SMA deposits; and long-term risk of deposit loss. In particular, the RP indicates that elevated TEQ is near the surface in some cores of SMA 5-1. Therefore, MNR may not always provide long-term effectiveness in these areas within the SMA.

Response: The discussion of MNR long-term effectiveness and permanence has been updated. Institutional controls is a common element to all alternatives, as discussed in Section 6.2

b. Alternative 2 discussion – CCS caps were also used at SMA 2-5 and partially at 2-4. An armor cap was also partially used at SMA 2-4. Dow discovered and repaired a section of the cap at SMA 2-5 that appeared to have been torn up by ice following installation, so this event should be mentioned to capture the lesson learned from BMA 2-5 winter effects, and accompanied by a brief discussion about changes to the installation protocol. This event underscores the need for monitoring and maintenance to ensure long-term effectiveness.

Response: Text has been updated in Section 6.3.5.2. Protocols for CCS installation will be discussed in the design and implementation plans, as appropriate.

c. Alternative 3 discussion – The second paragraph of this section has a discussion of wetlands and endangered species that probably should be in a BMA section.

Response: This text has been added to Section 6.4.2.

49. Section 6.3.2:
    a. Alternative 2 – 1st paragraph, top of page 75 – There is sentence about access across residential properties to the floodplain and river bank. This section is about the SMAs – is it likely that any residential property access will be needed? However, it should point out that access to the two currently identified SMAs will be across privately owned property, so we will need to work with the owner, because private owner cooperation can affect implementability. Can anything be said about what we expect regarding owner cooperation for SMA access?

Response: Current Section 6.3.6 has been updated with an additional discussion of coordination and cooperation with property owners.

b. The next sentence states that impacts related to construction support and access will be restored. Please mention that restoring wooded areas will likely be with less mature vegetation.

Response: The text has been modified.

50. Section 6.3.2, Alternative 3 discussion
    a. 1st paragraph on page 76 – Consider adding some discussion about the river being too shallow for some traditional wet removal processes.

Response: The text has been modified.

b. In addition to the information on access roads, consider adding some information about the potential upland areas needed for support if wet removal were conducted.

Response: This information is provided in the third paragraph of Section 6.3.6.3.

c. Similar to the Alternative 2 comments, it should be mentioned that private owner cooperation can affect implementability. Also, access to the SMAs does not seem to require crossing residential properties in this case?

Response: See response to comment 49a.

51. Alternative 3 (Removal) and Alternative 4 (Combination of In Situ Containment and Removal). As noted previously, it is not clear that a maximum removal depth of four feet will be adequate to meet remedial objectives.

Response: The sediment removal depths have been updated to the depth of contamination.

52. Section 6.3.2, Alternative 4 discussion – Please consider augmenting the discussion to point out that for SMA 5-1, a combination alternative maximizes implementability (or minimizes implementation challenges) while minimizing potential short-term impacts.

Response: Text has been revised.

53. Section 6.3.3 and Appendix C: The RP estimates the cost of MNR monitoring over 30 years at an individual SMA to be $28,000 (or less than $1,000 a year). This seems to be quite low – especially if chemical monitoring is required to document the effectiveness of MNR.

Response: For the purposes of the Response Proposal, the MNR monitoring cost estimate assumes monitoring every 5 years over the course of 30 years. A total of $28,000 equates to approximately $4,000 per monitoring event, which would include surface sediment sampling and analysis and bathymetric surveys.

54. Section 6.4, page 78, 2nd paragraph from bottom – Please mention that additional Segment 3 BMAs will be stabilized in 2016.

1) Section 6.4.1.2 – As noted above DEQ does not agree that the 0.1 foot limit with respect to flood elevation increases is accurate.

Response: The text in Section 6.4 has been updated to discuss stabilization of Segment 3 BMAs. Our understanding is that the Michigan Floodplain Act mandates a 0.1 ft limit in flood height. See response to Comment 44.

55. Section 6.4.1.3, Short-term effectiveness

a. Before this section, please add a section similar to 6.3.1.3 addressing reduction of TMV for the BMA alternatives. Alternatively, 6.3.1.3 could be eliminated and the degree that reduction of TMV is addressed for both SMAs and BMAs could be generally covered in 6.1.1.

Response: The evaluation criterion "reduction of toxicity, mass, or volume through treatment" has been added to the evaluation of the BMAs in Section 6.4.1.3.

b. Alternative 1 – Where this discusses the time to establish native vegetation, it might be worthwhile to mention that there is a cover crop the first year to provide some surface vegetation and protection.

Response: The text has been revised.

c. Alternative 2 – Similar to SMA alternatives, do we want to add some more details than we've provided in the past RPs? For example, the last paragraph on page 81 mentions increased truck traffic. Appendix C provides estimated volume of soil for each 100 feet of bank removed. Might it be useful to provide the approximate numbers of trucks transporting contaminated bank soil this might mean?

Response: Additional information has been added to estimate the number of truckloads associated with the BMA removal option.

d. Alternative 2 – Several of the BMAs appear to be adjacent to active farm fields – would there need to be enhanced run-off protection to mitigate short-term effects in these areas if banks were removed?

Response: It is standard practice to use a silt fence during BMA remedy construction to prevent soil runoff into the river. This measure will reduce run off from agricultural fields as well.

56. Section 6.4.1.4, Long-Term Effectiveness and Permanence

a. Alternative 1 – Similar to the In-Situ Containment discussion in section 6.3.1.5, it might be useful to briefly discuss the performance of the stabilization technologies during high flow, high shear stress conditions. The oldest treated banks areas are from 2007 – 2009 and there have been high energy events that can help assess the long-term performance of stabilized banks.

Response: The text has been revised to provide an indication of the performance of stabilization technologies used for bank stabilization to date.

b. Alternative 2 – The last paragraph of this section discusses the J/K removal. Is there any way that the text and maybe figure 5-11 can try to help an unfamiliar reader better understand the scope of a potential removal footprint? J/K was about 1,880 feet – if 5 acres were removed, this translates to about 0.28 acre/100 feet of bank. Another way to look at this might be removal of a bank requires an estimated cutback of X to Y feet from the top of the bank back into the property, depending on bank height.

Response: The text has been updated to discuss the potential bank removal footprint.

c. Page 83. Second paragraph. Please clarify the last sentence in this paragraph as follows (or similar) (additional language in ***italic boldface***): "Long term bank monitoring and adaptive management is not required under this alternative ***if the high TEQ deposit is removed***."

Response: The previous sentence states that through this alternative PCOI deposits will be removed. No changes have been made to the text.

57. Section 6.4.2, Implementability – Since all of the BMAs are on non-Dow property, can the RP say anything more at this point about landowner willingness to allow access? Several of the BMAs are on public park land – would there be implementation considerations coordinating with park usage? Several of the BMAs appear to be adjacent to active farm fields – would there be implementation considerations coordinating with farm activities?

Response: The text has been modified to indicate these additional considerations.

58. Section 7.1
    a. Please replace EPA website in 2.b with www.epa.gov/superfund/tittabawassee-river

Response: The website has been updated.

    b. Please replace 2.e as follows, or similar: "Establishment of local EPA staff who participate in project outreach activities."

Response: The text has been modified.

    c. Principle 3 – Please add a sentence at the end as follows, or similar. "EPA coordinates directly with the Saginaw Chippewa Indian Tribe of Michigan regarding the site."

Response: The text has been updated.

    d. Principle 5 – Please add an additional sentence: ***Also, monitoring and future residual risk assessment will inform the need for any necessary additional response activities (e.g., the identification of additional BMAs, etc.)***, or similar

Response: The text has been updated.

59. Figure 2-3B does not show the deposit at MM mentioned in the text in Section 2.6

Response: The figure has been updated.

60. Figure 3-4B – It would be useful to have figures similar to Segment 2 RP 3-33A and B for this and any other areas of interest to be addressed in the RP (actual data of each core).

Response: These figures have been added to the RP.

61. Figure 3-10 – It would be useful to blank out Island MM, similar to figure 3-3D.

Response: The figure has been updated.

62. Figures 3-18A and B and 3-20A and B – These figures do not show as NA all of the areas identified as hard surfaces on figures 3-16A and B. In some cases, areas identified as hard surfaces are reported as having undercutting and/or exposed roots. Please reconcile.

Response: The bank stability figures have been revised to show hard surfaces and geomorphic features as not applicable (NA).

63. Figure 3-25 – This figure does not exclude hard surfaces/no response action and includes three stability categories, rather than two.

Response: The figures have been revised to exclude hard surfaces and show two stability categories (high/moderate and low).

64. Figure 3-27 – When looking at the bank core distributions there appears to be limited or no data for approximately SW 670 – 676, SW 723 – 744, and NE 662 – 672. These areas have been characterized as low TEQ index, but may need to be treated as data gaps.

Response: Following review of the bank areas identified in the comments, no data gaps were identified. These bank areas are characterized as low TEQ based on the following rationale: 1) a core was collected within the same individual geomorphic unit, 2) the bank is an upland, high surface, or shoreline geomorphological unit, or 3) the minimum length of bank requiring sampling (300 ft for post-industrial age levee or low surface and 500 ft for pre-industrial age levee or intermediate surface) was not achieved.

65. Appendix B3:
    a. Figure B3-3 – One pin is labelled as both EP3 and EP4, and the maximum differential is listed as 3.6 feet, which is not consistent with the points shown.

Response: The figure has been revised.

    b. Several figures list an "EP5" when there only appears to be four points. See B3-5, B3-7, B3-17, and B3-20. Please reconcile or provide an explanation in Section 3.4.2.

Response: The figure has been revised.

66. Appendix C – Monitoring is likely to be more frequent than once every five years for many SMA alternatives.

Response: Comment noted. The costs are presented for comparative purposes across the different remedial alternatives. Monitoring plans and costs will be updated as appropriate during remedial design.

C. Minor Comments

The following comments would not require revision, but may be worthwhile to address since other comments require document revision.

67. Section 1, 1st paragraph – To mirror the information about the other Segments, you may want to add that the Segment 2 RP was approved in June 2013. You may also want to mention that response actions in Segment 3 are expected to start in 2016. Finally – typo, please insert "In November 2013, EPA issued an Action Memorandum for Segment 2 and the Segment 2 response actions began in summer of 2014

Response: The text has been revised.

68. Section 2.7.2.3 – Perhaps add a reference for the Segment 1 Response Proposal.

Response: The text has been revised.

69. Section 2.7.3, last sentence – Change the tense and indicate that the Segment 2 actions "were" implemented, not "are scheduled to be."

Response: The text has been revised.

70. Section 2.7.4 – Perhaps add a reference for the Segment 3 Response Proposal. Please consider rewriting "Two distinct SMAs and 10 additional distinct BMAs were identified in the Segment 3 Response Proposal and will be addressed during ~~remedial~~ response actions scheduled in 2016–2017."

Response: The text has been revised.

71. Footnote 3, page 16 – Insert "in" after "results."

Response: The text has been revised.

72. Section 3.2.1, page 21 – Typo "The results of the 2014 composite sampling were used to calculate the current average surface sediment TEQ concentration …"

Response: The text has been revised.

73. Section 3.9.3.5, page 40 – Typo "The cross sections ~~where~~ were then exported into CAD …"

Response: The text has been revised.

74. Section 4.3.2.5, p. 51. Please correct: The "US National Oceanic and Atmospheric Administration Fisheries Service" should be "National Oceanic and Atmospheric Administration's National Marine Fisheries Service".

Response: The text has been revised.

75. Section 6.3, page 66 – "In Alternative 4, in situ containment would be implemented in the upstream portion of SMA 5-1 (approximately station 781+00 to 782+75), and removal would be implemented in the downstream portion of SMA 5-1 (approximately station 782+75 to ~~787+50~~ 786+00), as shown in Figure 6-1." Figure 6-1 shows removal to about 786+00.

Response: The text has been revised.

76. Section 6.3.1.1, page 68 – Put a period at the end of Alternative 4 section.

Response: The text has been revised.

77. Section 6.3.1.5, page 74 – Put a period at the end of second paragraph Alternative 4 section.

Response: The text has been revised.

78. Section 6.3.2

a. Page 75, 3rd paragraph – Put a period "which can also be deployed utilizing a shallow draft boat system"

Response: The text has been revised.

b. Page 76, 1st paragraph, typos – "…in the upstream portion of the SMA due to challenges associated with installing and maintaining the sheet pile needed to establish a coffer dam in this area. Sheet pile is typically driven until refusal …"

Response: The text has been revised.

79. Section 6.3.3, page 77 – The following text from this section would be useful as a footnote to Table C-1: "The cost range for Alternative 2 (In Situ Containment) represents the expected range of costs for implementation of a CCS cap through an armored cap. Similarly, the cost range for Alternative 3 (Removal) represents the expected range of costs for implementation for wet removal and dry removal approaches."

Response: The text has been revised.

80. Section 6.4, page 79, 1st paragraph – typo "Evaluations of each of the piloted technologies implemented to date have been provided in the *Task 5 …"*

Response: The text has been revised.

81. Section 6.4.1.3, page 82 – typo "More so than with bank stabilization, worker safety concerns involve working around and operating construction equipment and removing and transporting large amounts of vegetation and soil."

Response: The text has been revised.

82. Section 6.4.1.4, page 83 – typo "Based on the results of early removal actions, early vegetation growth (grasses and forbs) would most likely develop under this BMA alternative over a period of two to five years …"

Response: The text has been revised.

83. Figure 5-9 – Typo, last box on flow chart should read "Complete Access Agreements …"

Response: The figure has been updated.